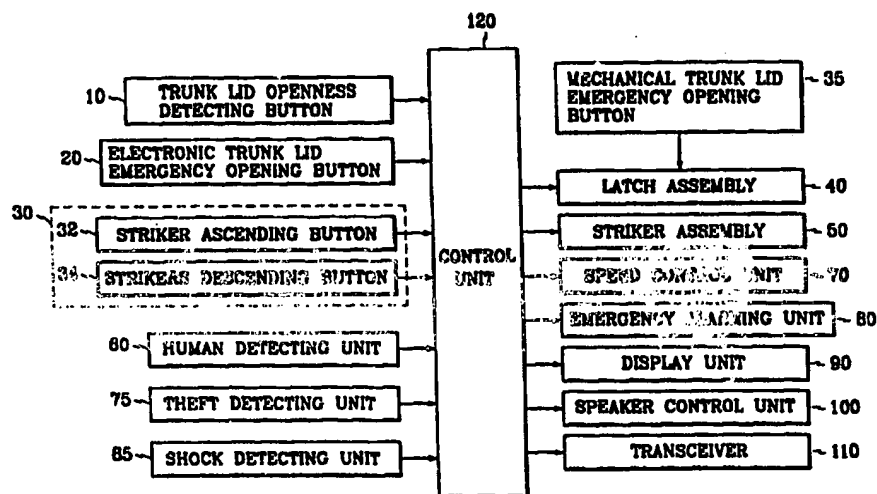




INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁶ : E05B 65/19		(11) International Publication Number: WO 99/04119
A1		(43) International Publication Date: 28 January 1999 (28.01.99)
(21) International Application Number: PCT/KR98/00207 (22) International Filing Date: 14 July 1998 (14.07.98) (30) Priority Data: 1997/32886 15 July 1997 (15.07.97) KR 1998/21570 10 June 1998 (10.06.98) KR (71)(72) Applicant and Inventor: KIM, Seong, Soo [KR/KR]; 107-1104 Mokryun Town, 716, Ilwon-dong, Kangnam-gu, Seoul 135-230 (KR). (74) Agent: KIM, Yeon, Soo; 648-23, Yeoksam-dong, Kang- nam-gu, Seoul 135-080 (KR).		(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, GM, HR, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG). Published With international search report.

(54) Title: TRUNK LID EMERGENCY OPENING APPARATUS OF AUTOMOBILE



(57) Abstract

A trunk lid emergency opening apparatus of an automobile by which a trunk can be opened by a person confined therein to thereby prevent in advance a criminal act utilizing a trunk of an automobile and to allow the person confined in the trunk to easily escape therefrom, the apparatus comprising: a mechanical trunk lid emergency opening button (35) exposed into an interior of a trunk; an electronic trunk lid emergency opening button (20) for generating a trunk lid emergency opening signal; a trunk lid openness detecting button (10) for being pressed down to generate a trunk lid closedness signal when the trunk lid (1) is closed; a human detecting unit (60) for detecting a person locked in the trunk to generate a human detecting signal; a control unit (120) for activating a solenoid to emergently open the trunk lid (1) when the trunk lid emergency opening signal is input or when the trunk lid closedness signal is input and the human detecting signal is input at the same time; and a latch assembly (40) for detecting a latch (47) from a striker (56) to emergently open the trunk lid (1) when the mechanical trunk lid emergency opening button (35) is pressed down or the solenoid (126) is activated.

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TRUNK LID EMERGENCY OPENING APPARATUS OF AUTOMOBILE

BACKGROUND OF THE INVENTION

5 FIELD OF THE INVENTION

The present invention relates to an emergency opening apparatus of automobile trunk lid, and more particularly to a trunk lid emergency opening apparatus of an automobile adapted to include a function of opening a trunk
10 lid from inside a trunk and another function of automatically detecting a person confined therein, thereby enabling the person to request an emergency assistance and to make an emergency escape therefrom under any confined circumstances.

15 DESCRIPTION OF THE PRIOR ART

As the number of automobiles are increased, so are the crimes involved with the automobiles, and particularly the crimes utilizing trunks originally made for transportation or storage of various articles.

20

By way of example, crimes such as kidnapping housewives in a basement parking lot in the broad day light, or kidnapping kids in the playground or schools are perpetrated. In the worst cases, a man or a woman is bound hand and foot, and put into a trunk of an automobile for ransom or
25 at times suffocated to death in the trunk.

A trunk of an automobile is usually equipped with, as illustrated in Figure 1, a trunk lid locking apparatus including a latch 2 fixed to a trunk lid 1, and a striker 4 fixed to a body 3 of the automobile, where coupling or
30 decoupling of the latch 2 and the striker 4 enables the trunk lid 1 to be

opened or closed. The trunk lid is opened by use of a trunk lid opening manipulator (button or lever) provided at one side of a driver or an automobile key. When the trunk lid 1 is closed, the latch 2 is coupled to the striker 4 to maintain the closedness of the trunk lid 1.

5

However, there is a problem in the conventional trunk lid locking apparatus thus constructed in that the trunk lid is only opened by way of the trunk lid opening manipulator or automobile key such that a person locked in the trunk cannot escape from the trunk unless assisted from outside, thereby making the trunk lid frequently used for crimes.

10

Still worse, there is a problem in that in case a child is locked in a trunk by mistake or mischievous act, he or she can be suffocated to death because there is no way to get out of the trunk without outside help.

15

SUMMARY OF THE INVENTION

The present invention is disclosed to solve the aforementioned problems and it is an object of the present invention to provide a trunk lid emergency opening apparatus of an automobile by which a person locked in the truck of an automobile can open the trunk according to manipulation of the person confined therein, or the trunk lid can be automatically opened when the person is locked in.

20

It is another object of the present invention to provide a trunk lid emergency opening apparatus of an automobile by which a trunk lid is opened a little for the person locked in the trunk to peek out.

25

It is still another object of the present invention to provide a trunk lid emergency opening apparatus of an automobile by which an emergency such

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as theft, collision, accident fall, kidnap or the like is transmitted to a particular person by a particular terminal equipment, against which the particular person transmits an emergency warning signal to the automobile to thereby cause the trunk lid to be opened and to cause the automobile to
5 generate an emergency warning sound.

In accordance with one object of the present invention, there is provided a trunk lid emergency opening apparatus of an automobile by which a latch fixed to a trunk lid and a striker fitted into a body of the automobile
10 are coupled or decoupled to thereby open or close the trunk lid, the apparatus comprising:

- a mechanical trunk lid emergency opening button exposed into an interior of a trunk; and

- a latch assembly for separating a latch from a striker to emergently
15 open a trunk lid when the mechanical trunk lid emergency opening button is pressed.

In accordance with another object of the present invention, there is provided a trunk lid emergency opening apparatus of an automobile by which
20 a latch fixed to a trunk lid and a striker fitted into a body of an automobile are coupled or decoupled to thereby open or close the trunk lid, the apparatus comprising:

- a mechanical trunk lid emergency opening button exposed into an interior of a trunk;

- 25 an electronic trunk lid emergency opening button for generating a trunk lid emergency opening signal;

- a trunk lid openness detecting button for being pressed down to generate a trunk lid closedness signal when the trunk lid is closed;

- a human detecting unit for detecting a person locked in the trunk to
30 generate a human detecting signal;

a control unit for activating a solenoid to emergently open the trunk lid when the trunk lid emergency opening signal is input or when the trunk lid closedness signal is input and the human detecting signal is input at the same time; and

- 5 a latch assembly for detecting a latch from a striker to emergently open the trunk lid when the mechanical trunk lid emergency opening button is pressed down or the solenoid is activated.

In accordance with still another object of the present invention, there
10 is provided a trunk lid emergency opening apparatus of an automobile by which a latch fixed to a trunk lid and a striker fitted into a body of an automobile are coupled or decoupled to thereby open or close the trunk lid, the apparatus comprising:

- a trunk lid openness detecting button for being pressed down to
15 generate a trunk lid closedness signal when the trunk lid is closed;

 a striker assembly for allowing the striker to rise upto and to fall down to a predetermined level;

 a striker ascending button for outputting an ascent signal to raise the striker;

- 20 a striker descending button for outputting a descent signal to lower the striker; and

 a control unit for rotating a striker driving motor in the forward direction to raise the striker when the ascent signal is input in a state where the trunk lid closedness signal is received from the trunk lid openness
25 detecting button, and for rotating the striker driving motor in the reverse direction to lower the striker when the descent signal is input.

It is still another object of the present invention to provide a trunk lid emergency opening apparatus of an automobile the apparatus comprising:

- 30 a trunk lid openness detecting button for being pressed down when

the trunk lid is closed to generate a trunk lid closedness signal;

a human detecting unit for generating a human detecting signal for detecting a person confined within a trunk;

a theft detecting unit for detecting whether or not an automobile is
5 robbed;

a shock detecting unit for detecting a shock resulted from an automobile crash or collision;

a speed reduction unit for limiting a running speed of an automobile to less than a predetermined speed;

10 an emergency alarming unit for generating an emergency warning;

a radio transceiver for transmitting an occurrence of emergency to a predetermined radio terminal unit and for receiving an emergency warning signal;

a control unit for controlling the radio transceiver to transmit an
15 occurrence of accident to a predetermined terminal unit when a theft detection signal and a shock detection signal are received from the theft detecting unit and the shock detecting unit, or for activating a solenoid to open the trunk lid and activating the speed control unit and the emergency alarming unit to limit the running speed of an automobile to less than a
20 predetermined speed and to generate an emergency warning when the shock detection signal and emergency alarming signal are received from the shock detecting unit and the radio transceiver or when the trunk lid closedness signal is input from the trunk lid openness detecting button and simultaneously the human detecting signal is input from the human detecting
25 unit; and

a latch assembly for detecting the latch from the striker to emergently open the trunk lid when the solenoid is activated.

BRIEF DESCRIPTION OF THE DRAWINGS

For fuller understanding of the nature and objects of the invention, reference should be made to the following detailed description taken in conjunction with the accompanying drawings in which:

Figure 1 is a schematic diagram of a trunk of an automobile
5 according to the prior art;

Figure 2 is a schematic block diagram for illustrating an emergency opening apparatus of a trunk lid in an automobile according to the present invention;

Figure 3 is a schematic diagram for illustrating a latch assembly
10 assembled to a striker assembly according to a first embodiment of the present invention;

Figure 4 is a schematic diagram for illustrating a latch assembly detached from a striker assembly to emergently open a trunk lid according to the first embodiment of the present invention;

Figure 5A is a schematic diagram for illustrating a latch lock holder
15 of a latch assembly according to the first embodiment of the present invention;

Figure 5B is a schematic diagram for illustrating a spring pin detached from the latch lock holder in Figure 5A;

Figure 5C is a schematic diagram for illustrating a latch lock
20 detached from the latch lock holder in Figure 5A;

Figure 6 is a perspective view of a striker assembly according to the first embodiment of the present invention;

Figure 7 is a plan for illustrating a striker raised from a striker
25 assembly according to the first embodiment of the present invention;

Figure 8 is a circuit diagram of a trunk lid emergency opening apparatus of an automobile according to the first embodiment of the present invention;

Figure 9 is a circuit diagram of a trunk lid emergency opening
30 apparatus of an automobile according to a second embodiment of the present

invention;

Figure 10 is a schematic diagram for illustrating a trunk lid being closed;

Figure 11 is a schematic diagram for illustrating a latch assembled to
5 a striker;

Figure 12 is a schematic diagram for illustrating a trunk lid being opened;

Figure 13 is a schematic diagram for illustrating a latch detached from a striker; and

10 Figure 14 is a schematic diagram for illustrating a trunk lid opened to a predetermined level.

DETAILED DESCRIPTION OF THE INVENTION

15 The preferred embodiments of the present invention will now be described in detail with reference to the accompanying drawings.

Figure 2 illustrates a schematic block diagram of a trunk lid emergency opening apparatus of an automobile according to the present
20 invention, wherein the apparatus includes a trunk lid openness detecting button 10, an electronic trunk lid emergency opening button 20, a striker manipulating button 30 having a striker ascending button 32 and a striker descending button 34, a mechanical trunk lid emergency opening button 35, a latch assembly 40, a striker assembly 50, a human detecting unit 60, a speed
25 control unit 70, a theft detecting unit 75, an emergency alarming unit 80, a shock detecting unit 85, a display unit 90, a speaker control unit 100, a radio transceiver 110 and a control unit.

The trunk lid openness detecting button 10 serves to detect whether a
30 trunk lid is opened or closed and input same to the control unit 120, and, as

illustrated in Figures 3 and 4, the button 10 is pressed down when the trunk lid is closed.

The electronic trunk lid emergency opening button 20 serves to input
5 a trunk lid emergency openness signal to the control unit 120 when a person confined in a trunk presses it, and as illustrated in Figure 7, is so designed as to be exposed to the outside, such that the person detained in the trunk can press it when the striker 56 is raised.

10 The striker ascending button 32 and the striker descending button 34 at the striker manipulating button 30 serve to input a striker ascending signal or a striker descending signal to the control unit 120 in order to raise or lower the striker 56 to a predetermined level, which, as illustrated in Figures 3 and 4, can be pressed by the person confined in the trunk as they are
15 mounted on the front surface of the striker assembly 50.

At this time, the buttons 20, 32 and 34 are so embodied as to be operated when they are touched by a person, such that they are prevented from being operated by being pressed by articles stored in the trunk.

20

The human detecting unit 60 serves to detect a person confined in a trunk of an automobile to generate a human detection signal to the control unit 120, which, as illustrated in Figures 7 and 8, includes a first human detecting unit 61 and a second human detecting unit 66, where the first
25 human detecting unit 61 is disposed with a main human detecting sensor 62, an auxiliary human detecting sensor 63, an amplifier 64 and a discriminator 65.

The main human detecting sensor 62 is a sensor for detecting an
30 ultrared light emitted from a human detained in a trunk, the auxiliary human

detecting sensor 63 is a sensor for functioning as an auxiliary to the main human detecting sensor 62, and for being disposed as an auxiliary sensor in preparation for an emergency when the main human detecting sensor 62 is blocked by mistake or by articles stored in to trunk.

5

The amplifier 64 is made to amplify signals output from the main human detecting sensor 62 and the auxiliary human detecting sensor 63 to input same to the discriminator 65, which in turn receives the signals amplified by the amplifier 64 to discriminate whether a person is confined in
10 the trunk.

The second human detecting unit 66 includes a high frequency oscillator 67 for oscillating a high frequency, by way of example, 1MHZ, and a high frequency receiver 68 for receiving the high frequency oscillated by
15 the high frequency oscillator 67, to thereby discriminate whether a person is detained in a trunk according to a principle that levels of the high frequency received from the high frequency receiver 68 is changed by approach of a human.

20 In other words, when a human approaches, level of the high frequency is increased and when the human is distanced, the level is decreased. By this phenomenon, the person confined in the trunk is detected.

The theft detecting unit 75 discriminates whether an automobile is
25 stolen and can be embodied by an automobile theft detecting apparatus mounted on an automobile to prevent theft.

In other words, a door of an automobile is not opened by manipulation of a predetermined remote controller, and when it is forcibly
30 opened, the theft detecting unit 75 detects it to thereby prevent theft.

Furthermore, the shock detecting unit 85 serves to detect a shock resulted from an automobile collision or accident fall, which can be embodied by a shock detecting sensor which activates an air bag mounted on
5 an automobile for life saving.

10 The latch assembly 40 serves to detach the latch 47 thereof from the striker 56 at the striker assembly 50 to emergently open a trunk lid when the mechanical trunk lid emergency opening button 35 is depressed or the solenoid 126 is activated by control of the control unit 120, as illustrated in Figures 3 and 4. Once the button 35 is depressed or the latch is detached from the striker 56 by the operation of the solenoid 126, the latch 47 is not designed to get coupled to the striker 56 again.

15 As illustrated in Figures 3, 4 and 5, in the latch assembly 40, when the button 35 is depressed or the solenoid 126 is operated, a push lever 41 is detached from a trip latch lever 42, which in turn touches the trip lever 44 by way of elasticity of a spring 43 to rotate a lock pin 49. The latch lock 45 is then detached from the latch holder 46 to cause the latch 47 to be separated
20 from the striker 56.

The latch lock holder 46 is disposed therein with a spring pin 48, and when the latch lock 45 is detached from the latch lock holder 46, the latch lock 45 is not allowed to be inserted into the latch lock holder 46 again to
25 thereby keep the trunk lid from being closed.

Meanwhile, the striker assembly 50 serves to vertically move the striker 56 to a predetermined level according to control of the control unit 120, as illustrated in Figures 6 and 7, where the assembly 50 includes a
30 motor 52 for driving the striker 56, power transmission means 54 for

converting a rotary movement of the motor 52 to a vertical movement to transmit same and the striker 56 for receiving a power from the power transmission means 54 to thereafter move vertically.

5 The power transmission means 54 which is rotated by the striker-driving motor 52 includes a rotary axis (54-1) formed at a periphery thereof with a male screw, a feed rod (54-2) for vertically moving the striker 56, a guide plate (54-3) for guiding the feed rod (54-2) to vertically move and a guide rail (54-4).

10

The speed control unit 70 controls an automobile not to accelerate the speed more than a predetermined speed according to control of the control means 120, the emergency alarming unit 80 generates an emergency alarm according to the control of the control unit 120.

15

The display unit 90 displays positions of the three buttons 20, 32 and 34 according to the control of the control unit 120 and simultaneously lightens the interior of the trunk.

20

The speaker control unit 100 controls a speaker not to operate, the radio transceiver 110 transmits the occurrence of an accident to a predetermined terminal unit (by way of example, cellular phone, beeper or the like) according to the control of the control unit 120 and receives an emergency alarm signal transmitted by a user to allow the control unit 120 to
25 be input therewith.

The control unit 120 operates the display unit 90 for a predetermined period of time when a signal is input from the trunk lid openness detecting button 10 that the trunk lid is closed.

30

Furthermore, the control unit 120 keeps operating the display unit 90 and controlling the speaker control unit 100 to thereby render a speaker 102 to be inoperative when a signal is input that the trunk lid is closed and simultaneously a human detecting signal is input, or the button 32 or 34 is depressed.

The control unit 120 also controls the transceiver 110 to transmit an occurrence of accident to a predetermined terminal unit. The control unit 120 operates the solenoid 126 and detaches the latch 47 at the latch assembly 40 from the striker 56 of the striker assembly 50 to emergently open the trunk lid, when a signal is received from the trunk lid openness detecting button 10 that the trunk lid is closed and it is discriminated that a person is confined in that trunk for more than a predetermined period of time after receipt of a human detecting signal from the human detecting unit 60, or the button 32 or 34 is kept depressed for more than a predetermined period of time by the person detained in the trunk.

Furthermore, the control unit 120 respectively controls the speed control unit 70 and the emergency alarming unit 80 to limit the speed of an automobile to less than a predetermined reference speed and concurrently generates an emergency alarm when the latch 47 is detached from the striker 56 to open the trunk lid.

The control unit 120 reversely rotates the motor 52 to raise the striker 56 to a predetermined height when the button 32 is depressed to allow the striker ascent signal to be input. The control unit 120 reversely rotates the motor 52 to descend the striker 56 when the button 34 is depressed to receive the striker descent signal.

The control unit 120 controls the transceiver 110 to transmit an

occurrence of an accident to a predetermined terminal unit when a theft detection signal and shock detection signal are received from the theft detecting unit 75 and the shock detecting unit 85, or a trunk lid closedness signal is input and simultaneously a human detection signal is input.

5

Still furthermore, the control unit 120 sets the solenoid 126 in motion to open the trunk lid and operates the speed control unit 70 and the emergency alarming unit 80 to limit the running speed of an automobile to less than a predetermined speed and to generate an emergency alarm when
10 the shock detection signal and emergency alarm signal are received or a trunk lid closedness signal is input and a human detection signal is input at the same time.

Meanwhile, Figure 8 is a circuit diagram of a trunk lid emergency
15 opening apparatus of an automobile according to the first embodiment of the present invention, where S1 is a trunk lid openness detecting switch for being turned off when the trunk lid is closed to depress the trunk lid openness detecting button 10, striker ascent/descent switches S2 and S3 are respectively rendered inoperative when the buttons 32 and 34 are depressed
20 by a person confined in the trunk, a trunk lid emergency opening switch S4 is turned off when the button 20 is depressed by the person in the trunk, a lamp P1 is a lamp for indicating whether a trunk lid is open or closed on an instrument panel at the driver's seat when the trunk lid is opened, and light emitting diodes LED1, LED2 and LED3 and a lamp P2 indicate positions of
25 the buttons 20, 32 and 34 to light the interior of the trunk, and correspond to the display unit 90.

The control unit 120 is disposed with a plurality of resistors R1 ~ R23, a plurality of capacitors C1 ~ C13, a plurality of transistors TR1 ~ TR11, a
30 diode D1, a plurality of logic gates AND1 ~ AND6, a plurality of logical sum

gates OR1 ~ OR9, a relay RL1, an inverter INV1, a plurality of flip flops F1 ~ F5, a voltage regulator 121, a plurality of timer circuits 122 ~ 125, a solenoid 126 and an over-current detecting unit 127, and controls the human detecting unit 60, the theft detecting unit 75 the shock detecting unit 85, the trunk lid openness detecting switch S1, striker ascent/descent switches S2 and SS3, the latch assembly 40, the striker assembly 50, the speed control unit 70, the emergency alarming unit 80, the display unit 90, the speaker control unit 100 and the transceiver 110 respectively.

Figure 9 is a circuit diagram of trunk lid emergency opening apparatus of an automobile according to the second embodiment of the present invention, which is almost same in construction as that of the first embodiment illustrated in Figure 8. Only difference is that flip flops F1, F2 and F3 and the over-current detecting unit 127 are used for driving of the striker-driving motor 52 in the first embodiment while a switch S5 is used in the second embodiment.

In other words, when the switch S5 for ascending and descending in cooperation with the striker 56 is completely raised, current is supplied to the motor 52 to lower the striker 56 and when the switch S5 is completely lowered, current is supplied to the motor 52 to raise the striker 56.

Now, operational effect of the trunk lid emergency opening apparatus of an automobile according to the present invention thus constructed will be described in detail.

As illustrated in Figure 10, when the trunk lid 1 is closed, the latch 47 at the latch assembly 40 is fixed to the striker 56 to maintain a closed state of the trunk lid 1 as illustrated in Figure 11.

When the striker 56 at the striker assembly 50 is detached from the latch 47 at the latch assembly 40 by way of the trunk lid opening manipulator disposed at one side of driver seat or an automobile key under a state the trunk lid 1 is closed, the trunk lid 1 is opened as illustrated in Figure 12.

5

At this time, when the person confined in the trunk depresses the mechanical lid emergency opening button 35 or the solenoid 126 is operated by the control of the control unit 120, the latch assembly 40 detaches the latch 47 from the striker 56 to emergently open the trunk lid 1.

10

In other words, the push lever 41 is detached from the latch lever 42 and the trip latch lever 42 touches the trip lever 44 by way of elasticity of the spring 43.

15

Successively, according as the trip lever 44 is raised upwards, the lock pin 49 is rotated and the latch lock 45 is separated from the latch lock holder 46 to detach the latch 47 from the striker 56.

20

At this time, as illustrated in Figure 5, because a spring pin 48 is equipped in the latch lock holder 46, when the latch lock 45 is detached from the latch lock holder 46, the latch lock holder 46 is not inserted thereinto the keep the trunk lid 1 from being closed.

25

When there is a need to repair the latch assembly 40 thus dismantled, there is a problem in that a trunk inner cover is taken off, and a pin hole must be drilled, thereby making it difficult to repair on the spot and sending the car to a repair shop.

Accordingly, when the trunk lid 1 is opened by the trunk lid opening manipulator or the automobile key, the trunk lid 1 is closed again, but when

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the person confined in the trunk presses the mechanical button 35 or the solenoid 126 is activated by the control of the control unit 120 to emergently open the trunk lid 1, the trunk lid 1 is not closed again.

5 Furthermore, in the striker assembly 50, when the motor 52 is rotated in the forward direction, as illustrated in Figures 6 and 7, the rotary axis 54-1 is also rotated in the forward direction to raise the feed rod 54-2 and to raise the striker 56 which integrally moves with the feed rod 54-2, such that the trunk lid 1 is raised to a predetermined height to allow the person confined in
10 the trunk to peek out, as illustrated in Figure 14.

 Furthermore, when the motor 52 is reversely rotated, the rotary axis 54-1 is reversely rotated to descend the feed rod 54-2 and concurrently the striker 56, thereby closing the trunk lid 1.

15

 Now, operation of the trunk lid emergency opening apparatus of an automobile according to the first embodiment of the present invention is described with reference to Figure 8.

20 A battery voltage (B+) (by way of example, 12V) applies an elastostatic regulator 121 via capacitors C1 and C2 which in turn converts the battery voltage (B+) to a predetermined voltage (Vcc) (by way of example, 9V) for operating the control unit 120 to supply same via capacitors C3 and C4.

25

 The trunk lid openness detecting switch S1 is rendered inoperative when the trunk lid 1 is closed, and the battery voltage (B+) is divided by resistors R2 and R3 to be input to a first logic gate AND1.

30 A voltage signal of high level is output from the first logic gate

AND1 and is input to second, third and fourth logic gates AND 2, AND3 and AND4 and to again input to a first logic sum gate OR1 for a predetermined period of time (by way of example, 10 seconds) determined by charge/discharge constant of capacitor C5 and resistor R4.

5

Successively, the first OR gate OR1 outputs the voltage signal of high level to a base terminal of first transistor TR1 to turn on the first transistor TR1, whereby the battery voltage (B+) is applied to a lamp P2 of the display unit 90 and to the light emitting diodes LED1, LED2 and LED3 to light the lamp P2 and the diodes LED1, LED2 and LED3.

10

In other words, when trunk lid 1 is closed, the interior of the trunk is lighted for a predetermined time (by way of example, 10 seconds) to allow the person detained in the trunk to recognize positions of the buttons 20, 32 and 34.

15

Meanwhile, when the button 32 is depressed by the person confined in the trunk in a state the voltage signal of high level is generated from AND1, the striker ascent switch S2 is rendered inoperative, to input the voltage signal of high level to a second logic sum gate OR2 from which the voltage signal of high level is output.

20

Successively, a voltage signal of high level is input to a set terminal S of first flip flop (F1) for a predetermined time determined by charge/discharge constant of capacitor C9 and resistor R12, where the first flip flop (F1) continuously outputs the voltage signal of high level to fifth logic AND gate AND5 via a non-inversion output terminal Q. A logic multiplication is performed on the voltage signal of high level output from the non-inversion output terminal Q and the other voltage signal of high level output from the second AND2, and a voltage signal of high level is output to

30

a second transistor T2 and a base terminal of a fourth transistor T4.

Successively, a third transistor TR3 and a fifth transistor T5 are turned on to rotate the motor 52 in the forward direction and to raise the
5 striker 56.

In other words, when striker ascent switch S2 is turned off, a voltage signal of high level is generated from the fifth AND5, which in turn turns the second, third, fourth and fifth transistors T2, T3, T4 and T5. Then the motor
10 52 is applied with electrostatic voltage for ascending and descending the striker 56 to rotate the motor in the forward direction. The striker 56 is then raised.

Meanwhile, when the striker descending button 34 is depressed by a
15 person confined in the trunk to turn off the striker descent switch S3 in a state where the trunk lid 1 is closed to cause AND 1 to output a voltage signal of high level, the voltage of high level is input to AND3, which in turn outputs a voltage signal of high level.

20 When the voltage signal of high level is output from AND3, a voltage signal of high level is input to the set terminal S at the second flip flop (F2) for a predetermined time determined by charge/discharge constant of capacitor C10 and resistor R13 and a continuous voltage signal of high level is output to a sixth logic gate AND 6 from the non-inversion output terminal
25 (Q) of the second flip flop (F2).

A logical multiplication is performed at the sixth logic gate AND6 on the voltage signal output from the non-inversion output terminal (Q) and the voltage signal output from the third logic gate AND3 to thereafter be output
30 to base terminals of sixth and eighth transistors T6 and T8.

Successively, when the trunk lid 1 is closed and simultaneously the striker descending button 34 is depressed to turn off the striker descent switch S3, a voltage signal of high level is output from the sixth logic gate AND6, turning on the sixth, seventh, eighth and ninth transistors T6~T9. An invert voltage is applied to the motor 52 for raising and lowering the striker 56 to rotate the motor 52 in the reverse direction. The striker 56 is then lowered.

When the motor 52 is completely raised or lowered to allow an overcurrent to flow therein, overcurrent detecting unit 127 detects its fact and inputs a reset signal to reset terminal R at flip flops F1 and F2 to reset the flip flops F1 and F2. The power is then cut off to the motor 52 to stop the striker 56.

Meanwhile, when the person confined in the trunk keeps pressing the button 34 beyond the predetermined time (time good enough to fully lower the striker 56) all in a fluster, in other words, when the striker descending switch S3 is turned off beyond the predetermined time determined by charge/discharge constant of resistor R11 and capacitor C8, a voltage signal of high level is input to the second logic sum gate OR2, which in turn outputs a voltage signal of high level to thereby raise the striker 56. Accordingly, the striker 56 is automatically ascended.

Furthermore, human detecting main sensor 62 or human detecting auxiliary sensor 64 detects ultrared rays emitted from a person confined in the trunk to send same to amplifying unit 64, which amplifies a signal output from the sensor 62 or 64 to send same to a discriminating unit 65. The discriminating unit 65 receives the signal output from the amplifying unit 64 and if it discriminates that a person is detained in the trunk, it sends a voltage

signal of high level to a fourth logic gate AND4.

Because level of high frequency received by the high frequency receiver 68 varies according to approach of a human, detection is made as to whether a person is confined in the trunk by way of level variations of high frequency received at the high frequency receiver 68, and if it is discriminated that a person is confined in the trunk, the second human detecting unit 66 outputs a voltage signal of high level to the fourth logic gate AND4.

10

When the voltage signal of high level is input from the human detecting unit 60 in a state where the trunk lid 1 is closed to receive a voltage signal of high level from the first logic gate AND1, the fourth logic gate AND4 outputs a voltage signal of high level to a first timer circuit 122.

15

The first time circuit 122 in turn outputs a voltage signal of high level to fourth logic sum gate OR4 when a voltage signal of high level is input from the fourth logic gate AND4 beyond a predetermined time (by way of example, 2 seconds), and a logic sum is performed at third logic sum gate OR3 on the voltage signals input according to activation or deactivation of striker ascent switch S2 or striker descent switch S3 to output same to the fourth logic sum gate OR4.

A logic sum is performed at the fourth logic sum gate OR4 on the voltage signal of high level output from the first timer circuit 122 and the voltage signal output from the third logic sum gate OR3 to output same to the set terminal S at the third flip flop F3.

When the voltage signal of high level is input from the fourth logic sum gate OR4, the third flip flop F3 keeps inputting a voltage signal of high

30

level to the first logic sum gate OR1 until a reset signal is input, to drive the display unit 90. Simultaneously the third flip flop F3 inputs the voltage signal of high level to speaker control unit 100 to stop operation of a speaker 102 and inputs same to the transceiver 110 via a ninth logic sum gate OR9 to
5 thereby cause the transceiver 100 to send an occurrence of an accident to a predetermined terminal unit.

In other words, when the voltage signal of high level is input to a base terminal of an eleventh transistor T11 from the third flip flop F3, the
10 eleventh transistor T11 is rendered operative to turn off a relay RL1 and again the speaker 102 subsequently.

Successively, when the human detecting unit 60 detects that a person is confined in a trunk with its lid closed or when the person in the trunk
15 presses the striker ascending button 32 or descending button 34, the interior of the trunk is lighted and at the same time positions of the buttons 20, 32 and 34 become known to the person confined in the trunk. Inoperation of the speaker 102 in the automobile enables to request an easy rescue call and the transceiver 110 is operated to let known the occurrence of an accident via a
20 predetermined terminal unit.

At this time, the ninth logic sum gate OR9 performs a logic sum on output signal of the third flip flop F3, output signal of theft detecting unit 75 and output signal of shock electing unit 85 and outputs the same.

25

Successively, when the theft detecting unit 75 detects a theft of an automobile to output a theft detection signal of high level, or detects a collision, an accidental fall of the automobile and the like to output a shock detection signal of high level, a voltage signal of high level is generated from
30 the ninth logic sum gate OR9 to activate the transceiver 110 and to let know

the occurrence of the accident via a predetermined terminal unit.

Furthermore, the output signal of the third flip flop F3 is input to second timer circuit 123, which in turn outputs a voltage signal of high level
5 to fifth logic sum gate OR5 when a voltage signal of high voltage is output from the third flip flop F3 beyond a predetermined time (by way of example, 3 minutes), where the second timer circuit 123 is reset when the voltage signal of high level is input from the third logic sum gate OR3.

10 Next, the third timer circuit 124 outputs a voltage signal of high level to the fifth logic sum gate OR5 when signal of high level is output from the third logic sum gate OR3 beyond a predetermined time (by way of example, 20-30 seconds), where a logic sum is performed at the fifth logic sum gate OR5 on the output signals from the second timer circuit 123 and the third
15 timer circuit 123, which is output to a set terminal S of fourth flip flop F4.

The fourth flip flop F4 outputs a voltage signal of high level to seventh logic sum gate OR7 via a non-inversion terminal Q when a voltage signal of high level is input from the fifth logic sum gate OR5, where, a logic
20 sum is performed at the seventh logic sum gate OR7 on the signal output through the non-inversion terminal Q of the fourth flip flop F4, the voltage signal input ON/OFF state of the mechanical trunk lid emergency opening switch S4, the output signal of the shock detecting unit 85 and the output signal of the transceiver 110, which is then output to a base terminal of tenth
25 transistor T10.

Successively, when a predetermined time (by way of example, 3 minutes) lapses in a state where a person confined in the trunk cannot depress the button 32 or 34, or when the button 32 or 34 is being kept depressed for
30 more than a predetermined time (by way of example, 20-30 seconds), or

when the mechanical trunk lid emergency opening button 20 is depressed to turn off the electric trunk lid emergency opening switch S4, a voltage signal of high level is generated from the seventh logic sum gate OR7, thereby turning on the tenth transistor T10. By this, the solenoid 126 is activated to
5 cause the latch 47 at the latch assembly 40 to be detached from the striker 56 of the striker assembly 50 and to open the trunk lid 1.

Furthermore, when a voltage signal of high level is output from the seventh logic sum gate OR7, the speed control unit 70 and the emergency
10 alarming unit 80 are rendered operative, to limit the speed of an automobile to a predetermined speed (by way of example, speed at which the person confined in the trunk can easily escape therefrom) and to simultaneously perform an emergency alarming work.

*will control
speed after
detecting
person in
trunk*

15 At this time, according as a logic sum is performed at the seventh logic sum gate OR7 on the signal output from the fourth flip flop F4 via non-inversion terminal Q, the voltage signal input by the ON/OFF state of the electronic trunk lid emergency opening switch S4, the output signal of the shock detecting unit 85 and the output signal of the transceiver 110, the tenth
20 transistor T10 is turned on, even though a shock detecting signal of high level is output from the shock detecting unit 85 or an emergency alarming signal of high level is output from the transceiver 110. By this, the solenoid 126 is rendered operative to cause the latch 47 to be separated from the striker 56 and to thereby cause the trunk lid 1 to be opened. Then, the speed
25 control unit 70 and the emergency alarming unit 80 are rendered operative to limit the speed of an automobile to a predetermined speed (by way of example, speed at which the person confined in the trunk can easily escape therefrom) and to concurrently perform an emergency alarming work.

30 Furthermore, fourth timer circuit 125 outputs a voltage signal of high

level to eighth logic sum gate OR8 when a voltage signal of high level is kept coming from the seventh logic sum gate OR7 beyond a predetermined time. A logic sum is performed at the eighth logic sum gate OR8 on the voltage signal of high level output from the fourth timer circuit 125 and the voltage signal of high level input through capacitor C12 and resistor R22 when a battery is replaced and a reset signal is input to reset terminal R of the third and fourth flip flops F3 and F4, such that the solenoid 126, the speed control unit 70 and the emergency alarming unit 80 are not operated during a predetermined time after the trunk lid 1 is emergently opened or during a time the battery is replaced.

Successively, a voltage signal of high level is input to a set terminal S of fifth flip flop F5 during the battery replacement, and the fifth flip flop F5 inputs a voltage signal of high level to sixth logic sum gate OR6 to automatically maintain the striker 56 in downward state during the battery replacement.

Meanwhile, in the trunk lid emergency opening apparatus of an automobile according to the second embodiment of the present invention illustrated in Figure 9, when a person confined in the trunk depresses the button 32 to turn off the switch S2 in a state when the trunk lid 1 is closed to cause the first logic gate AND1 to output a voltage signal of high level, the voltage signal of high level is input to the second logic sum gate OR2, such that a voltage signal of high level is output from the second logic gate AND2.

25

As mentioned above, when the voltage signal of high level is output from the second logic gate AND2, the second, third, fourth and fifth transistors T2, T3, T4 and T5 are rendered operative, and an electrostatic voltage is applied to the motor 52 for raising and lowering the striker 56 to rotate the motor 52 in the forward direction. The striker 56 is then ascended.

30

At this time, when the striker 56 is completely raised, the switch S5 causes A terminal to connect to B terminal, thereby cutting off supply of current to the motor 52 by way of diode D3 to stop the motor 52.

5

Meanwhile, when the button 34 is depressed by a person confined in the trunk to turn off the switch S3 in a state where the trunk lid 1 is closed to cause the first logic gate AND1 to output a voltage signal of high level, the voltage signal of high level is input to the third logic gate AND3, from which
10 a voltage signal of high level is output.

When the voltage signal of high level is output from the third logic gate AND3, as mentioned above, the sixth, seventh, eighth and ninth transistors T6, T7, T8 and T9 are reentered operative and a reverse voltage is
15 applied to the motor for ascending and descending the striker 56. The striker driving motor 52 is reversely rotated to lower the striker 56.

At this time, when the striker 56 is completely lowered, the switch S5 causes B terminal to be connected to C terminal, thereby cutting off supply of
20 current to the motor 52. The motor 52 is then stopped.

In other words, when the switch S5 that is raised or lowered in cooperation with the striker 56 is completely ascended, current is supplied to the motor 52 to lower the striker 56. When the switch S5 is completely
25 descended, current is supplied to the motor 52 to raise the striker 56.

As apparent from the foregoing, there is an advantage in the trunk lid emergency opening apparatus of an automobile according to the present invention, in that a person kidnapped, bound hand and foot, and confined in a
30 trunk of an automobile can escape because a trunk lid is automatically

opened after a predetermined period of time lapses.

There is another advantage in that an interior of the trunk is lighted by human detecting unit mounted therein and positions of various buttons are
5 let known to the person confined therein, so that when a striker ascent button is depressed, a striker is ascended to raise the trunk lid up to 50 millimeters and to provide a gap to the person kept in the trunk through which he or she can peek out and call for assistance.

10 There is still another advantage in that, when it is discriminated that the person confined in the trunk can escape alone, a trunk lid emergency opening button is pressed to limit the speed of an automobile the person is confined in and an emergency alarming apparatus is rendered operative to thereby enable to advise people around that the automobile is a vehicle being
15 involved or used for crime.

There is still another advantage in that, once the trunk lid emergency opening button is operated, a latch assembly is disintegrated to bar the trunk lid from being closed, so that, a criminal act involving a trunk of an
20 automobile can be prevented in advance and the person confined in the trunk of an automobile can escape easily therefrom.

There is still further advantage in that an occurrence of accident such as theft, collision, fall of an automobile, kidnap of a person or the like can be
25 transmitted to a predetermined terminal unit to let it known that a particular person is in trouble, by which the particular person can transmit an emergency alarming signal to the automobile to emergently open the trunk lid, to generate an emergency alarming sound and to allow the automobile in trouble to be pursued.

WHAT IS CLAIMED IS:

1. A trunk lid emergency opening apparatus of an automobile by which a latch fixed to a trunk lid and a striker fitted into a body of the automobile are coupled or decoupled to thereby open or close the trunk lid, the apparatus comprising:
 - a mechanical trunk lid emergency opening button exposed into an interior of a trunk; and
 - a latch assembly for separating a latch from a striker to emergently open a trunk lid when the mechanical trunk lid emergency opening button is pressed.
2. The apparatus as defined in claim 1, wherein the latch assembly is constructed such that, when the mechanical trunk lid emergency button is depressed, a trip latch lever touches a trip lever to rotate a lock pin, to detach a latch lock from a latch lock holder and to thereby detach the latch from the striker.
3. The apparatus as defined in claim 2, wherein the latch lock holder is disposed therein with a spring pin such that, when the latch lock is detached from the latch lock holder, the latch lock is not allowed to be inserted into the latch lock holder again to keep the trunk lid from being closed.
4. A trunk lid emergency opening apparatus of an automobile by which a latch fixed to a trunk lid and a striker fitted into a body of the automobile are coupled or decoupled to thereby open or close the trunk lid, the apparatus comprising:
 - an electronic trunk lid emergency opening button for outputting a trunk lid emergency opening signal;
 - a trunk lid openness detecting button for being depressed to output a

trunk lid closing signal when the trunk lid is closed;

a human detecting unit for detecting a person confined in a trunk to output a human detecting signal;

a control unit for activating a solenoid to emergently open the trunk lid when the trunk lid emergency opening signal is input or when the trunk lid closedness signal is input and the human detecting signal is input at the same time; and

a latch assembly for detecting a latch from a striker to emergently open the trunk lid when the mechanical trunk lid emergency opening button is pressed down or the solenoid is activated.

5. A trunk lid emergency opening apparatus of an automobile by which a latch fixed to a trunk lid and a striker fitted into a body of the automobile are coupled or decoupled to thereby open or close the trunk lid, the apparatus comprising:

a mechanical trunk lid emergency opening button exposed into an interior of a trunk;

an electronic trunk lid emergency opening button for generating a trunk lid emergency opening signal;

a trunk lid openness detecting button for being pressed down to generate a trunk lid closedness signal when the trunk lid is closed;

a human detecting unit for detecting a person locked in the trunk to generate a human detecting signal;

a control unit for activating a solenoid to emergently open the trunk lid when the trunk lid emergency opening signal is input or when the trunk lid closedness signal is input and the human detecting signal is input at the same time; and

a latch assembly for detecting a latch from a striker to emergently open the trunk lid when the mechanical trunk lid emergency opening button is pressed down or the solenoid is activated.

6. The apparatus as defined in claim 5, wherein the latch assembly is constructed such that, when the mechanical trunk lid emergency opening button is depressed or the solenoid is rendered operative, a trip latch lever touches a trip lever to rotate a lock pin, to detach a latch lock from a latch lock holder and to thereby detach the latch from the latch lock holder.

7. The apparatus as defined in claim 6, wherein the latch lock holder is mounted therein with a spring pin such that, when the latch lock is detached from the latch lock holder, the latch lock is not allowed to be inserted into the latch lock holder again to keep the trunk lid from being closed.

8. The apparatus as defined in claim 5, wherein the human detecting unit comprises:

15 a first human detecting unit for detecting ultrared rays emitted from human body to discriminate whether there is a human confined in a trunk; and

 a second human detecting unit for discriminating whether there is a human confined in a trunk according to levels of received high frequency which is varied according to approach of the human.

9. The apparatus as defined in claim 8, wherein the first human detecting unit comprises:

 a human detecting sensor for detecting ultrared rays emitted from a human detained in a trunk;

 an amplifier for amplifying a signal output from the human detecting sensor to generate same; and

 a discriminating unit for receiving the signal output from the amplifier to discriminate whether there is a human confined in the trunk.

10. The apparatus as defined in claim 8, wherein the second human detecting unit comprises:

a high frequency oscillator for oscillating the high frequency; and

5 a high frequency receiver for discriminating whether there is a human detained in the trunk according to levels of received high frequency which is varied according to approach of the human.

11. The apparatus as defined in claim 5, wherein the apparatus further comprises a speed limiting unit for limiting the running speed of the automobile to less than a predetermined speed, and the controller controls the speed limiting unit to limit the running speed of the automobile to less than a predetermined speed when the solenoid is activated to emergently open the trunk lid.

12. The apparatus as defined in claim 5, wherein the apparatus further comprises an emergency alarming unit for generating an emergency alarming sound, and the control unit controls the emergency alarming unit to generate an emergency alarming sound when the solenoid is operated to emergently open the trunk lid.

13. The apparatus as defined in claim 5, wherein the apparatus further comprises a speaker control unit for controlling operation of a speaker in the automobile, and the control unit controls the speaker control unit to stop operation of the speaker when a trunk lid close signal is input from the trunk lid openness detecting button and concurrently a human detection signal is input from the human detecting unit.

14. The apparatus as defined in claim 5, wherein the apparatus further comprises a transceiver for transmitting radio waves to a central control unit in order to trace a position of an automobile, and the control unit controls the

transceiver to transmit the radio waves when a trunk lid close signal is input from the trunk lid openness detecting button and simultaneously a human detection signal is input from the human detecting unit.

- 5 15. The apparatus as defined in claim 5, wherein the apparatus further comprises a display unit for enlightening an interior of a trunk and simultaneously displaying a position of the electronic trunk lid emergency opening button, and the control unit serves to activate the display unit when a trunk lid close signal is input from the trunk lid openness detecting button.

10

16. The apparatus as defined in claim 15, wherein the control unit activates the display unit when a human detection signal is input from the human detecting unit.

- 15 17. The apparatus as defined in claim 5, wherein the apparatus further comprises:

a striker assembly for allowing the striker to rise upto and to fall down to a predetermined level;

a striker ascending button for outputting an ascent signal to raise the
20 striker;

a striker descending button for outputting a descent signal to lower the striker; and

a control unit for rotating a striker driving motor in the forward direction to raise the striker when the ascent signal is input in a state where
25 the trunk lid closedness signal is received from the trunk lid openness detecting button, and for rotating the striker driving motor in the reverse direction to lower the striker when the descent signal is input.

18. The apparatus as defined in claim 17, wherein the control unit detects a
30 current for striker driving motor and stops operation of the striker driving

motor when an overcurrent flows in the striker driving motor.

19. The apparatus as defined in claim 17, wherein the apparatus further comprises a switch which rises or falls in cooperation with the striker, such that, when the switch is completely raised, the current is supplied to the
5 striker driving motor to lower the striker, and when the switch is completely lowered, the current is supplied to the striker driving motor to raise the striker.

10 20. The apparatus as defined in claim 17, wherein the striker assembly further comprises:

a striker;

a striker driving motor for receiving an electric power according to control of the control unit to rotate in the forward or reverse direction; and

15 power transmission means for converting a rotary motion of the striker driving motor to a vertical motion to transmit same to the striker.

21. The apparatus as defined in claim 20, wherein the power transmission means comprises:

20 a rotary axis formed at a periphery thereof with a male screw;

a feed rod for vertically moving the striker; and

guide means for guiding the feed rod to vertically move.

22. The apparatus as defined in claim 21, wherein the guide means
25 comprises:

a guide plate integrally formed with the feed rod and the striker; and

a guide rail for guiding the guide plate to vertically move.

23. The apparatus as defined in claim 17, wherein the control unit activates a
30 solenoid to emergently open a trunk lid when the striker ascending button or

the striker descending button is depressed beyond a predetermined time to thereby allow an ascending signal or a descending signal to be input beyond a predetermined time.

- 5 24. A trunk lid emergency opening apparatus of an automobile by which a latch fixed to a trunk lid and a striker fitted into a body of the automobile are coupled or decoupled to thereby open or close a trunk lid, the apparatus comprising:

10 a trunk lid openness detecting button for being depressed when the trunk lid is closed to output a trunk lid close signal;

a striker assembly for ascending or descending the striker to a predetermined level;

a striker ascending button for outputting an ascent signal for ascending the striker;

15 a striker descending button for outputting a descent signal for descending the striker; and

a control unit for rotating a striker driving motor in the forward direction to raise the striker when the ascend signal is input in a state where the trunk lid closedness signal is received from the trunk lid openness
20 detecting button, and for rotating the striker driving motor in the reverse direction to lower the striker when the descent signal is input.

25 25. The apparatus as defined in claim 24, wherei the control unit detects the current in the striker driving motor to stop the operation of the striker driving motor when an overcurrent flows in the striker driving motor.

26. The apparatus as defined in claim 24, wherein the apparatus further comprises a switch which ascends or descends in cooperation with the striker, where the current is supplied to the striker driving motor to lower the striker
30 when the switch is completely raised and the current is supplied to the striker

driving motor to raise the striker when the switch is completely lowered.

27. The apparatus as defined in any of the claims 24, 25 and 26, wherein the control unit rotates the striker driving motor in the forward direction to raise the striker when the striker descending button is depressed beyond a predetermined time to allow a descent signal to be input beyond a predetermined time.

28. The apparatus as defined in any of the claims 24, 25 and 26, wherein the apparatus further comprises a display unit for enlightening an interior of the trunk and simultaneously displaying positions of the striker ascending button and the striker descending button, and the control unit activates the display unit when a trunk lid close signal is input from the trunk lid openness detecting button.

29. The apparatus as defined in claim 28, wherein the control unit activates the display unit when the striker ascending button or the striker descending unit is depressed to allow an ascent signal or descent signal to be input.

30. The apparatus as defined in any of the claims 24, 25 and 26, wherein the striker assembly comprises:

a striker;

a striker driving motor for receiving an electric power according to control of the control unit to rotate in the forward direction or in the reverse direction; and

power transmission means for converting a rotary motion of the striker driving motor to vertical motion to transmit same to the striker.

31. The apparatus as defined in claim 30, wherein the power transmission means comprises:

a rotary axis for being rotated by the motor and for being forward at a periphery thereof with a male screw;

a feed rod for vertically moving the striker; and

guide means for guiding the feed rod to vertically move.

5 32. The apparatus as defined in claim 31, wherein the guide means comprises:

a guide plate integrally formed with the feed rod and the striker; and

a guide rail for guiding the guide plate to vertically move.

10 33. A trunk lid emergency opening apparatus of an automobile, the apparatus comprising:

a human detecting unit for generating a human detecting signal for detecting a person confined within a trunk;

15 a theft detecting unit for detecting whether or not an automobile is robbed;

a shock detecting unit for detecting a shock resulted from an automobile crash or collision;

a speed reduction unit for limiting a running speed of an automobile to less than a predetermined speed;

20 an emergency alarming unit for generating an emergency warning;

a radio transceiver for transmitting an occurrence of emergency to a predetermined radio terminal unit and for receiving an emergency warning signal;

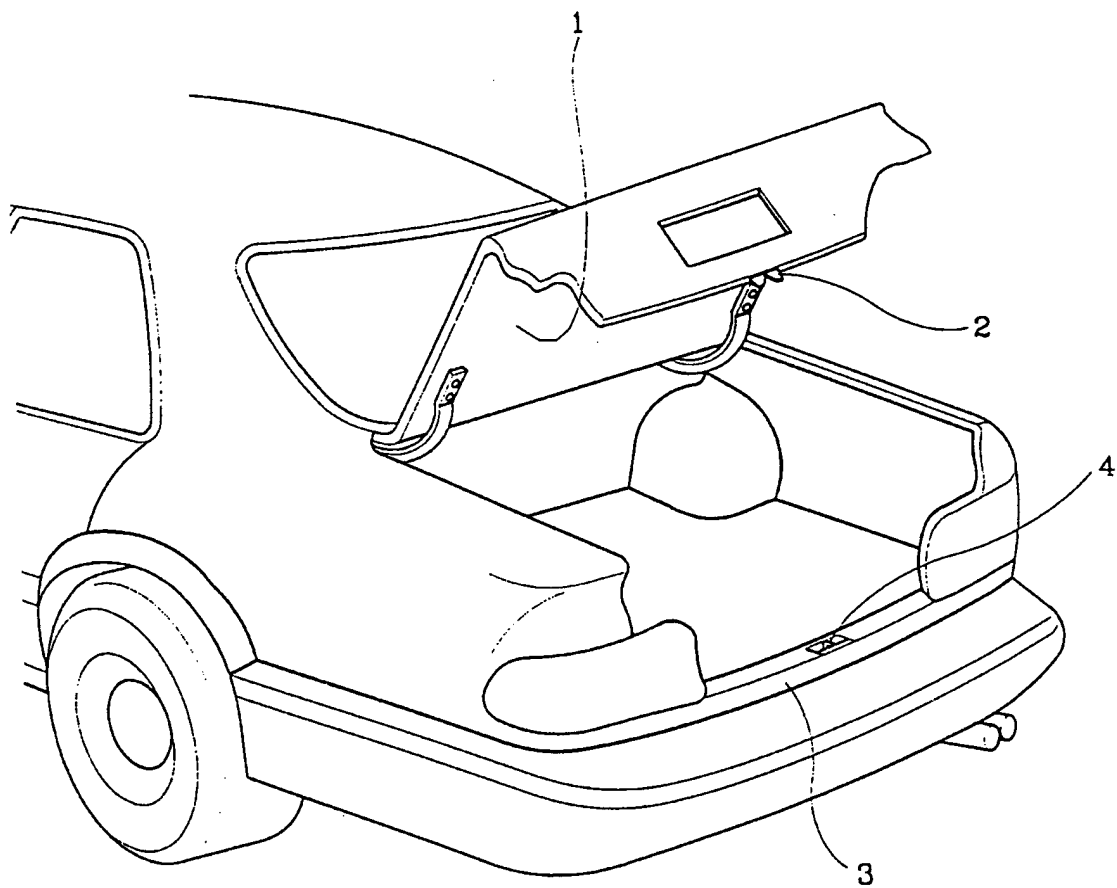
25 a control unit for controlling the radio transceiver to transmit an occurrence of accident to a predetermined terminal unit when a theft detection signal and a shock detection signal are received from the theft detecting unit and the shock detecting unit, or for activating a solenoid to open the trunk lid and activating the speed control unit and the emergency alarming unit to limit the running speed of an automobile to less than a
30 predetermined speed and to generate an emergency warning when the shock

detection signal and emergency alarming signal are received from the shock detecting unit and the radio transceiver or when the trunk lid closedness signal is input from the trunk lid openness detecting button and simultaneously the human detecting signal is input from the human detecting
5 unit; and

a latch assembly for detecting the latch from the striker to emergently open the trunk lid when the solenoid is activated.

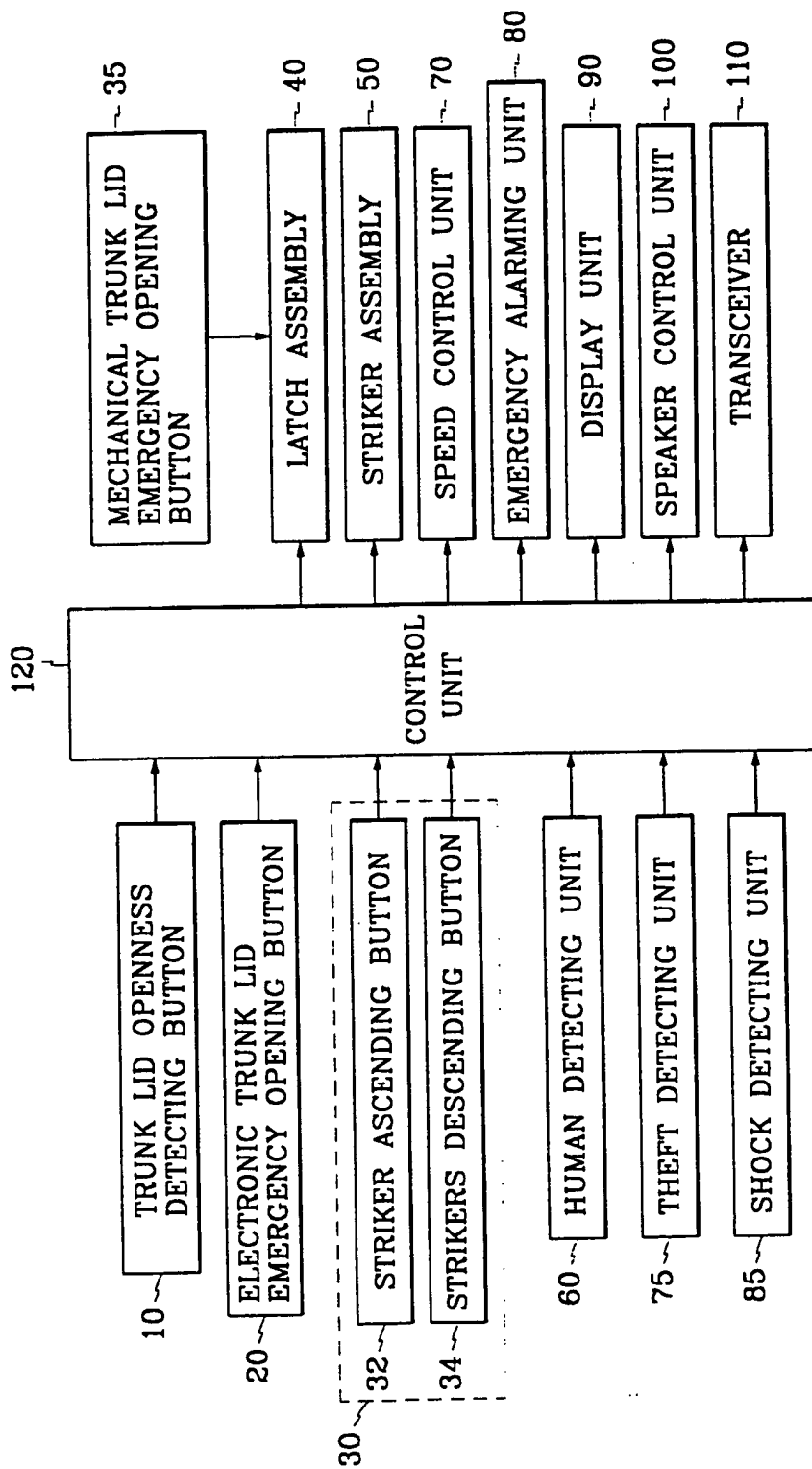
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FIG.1



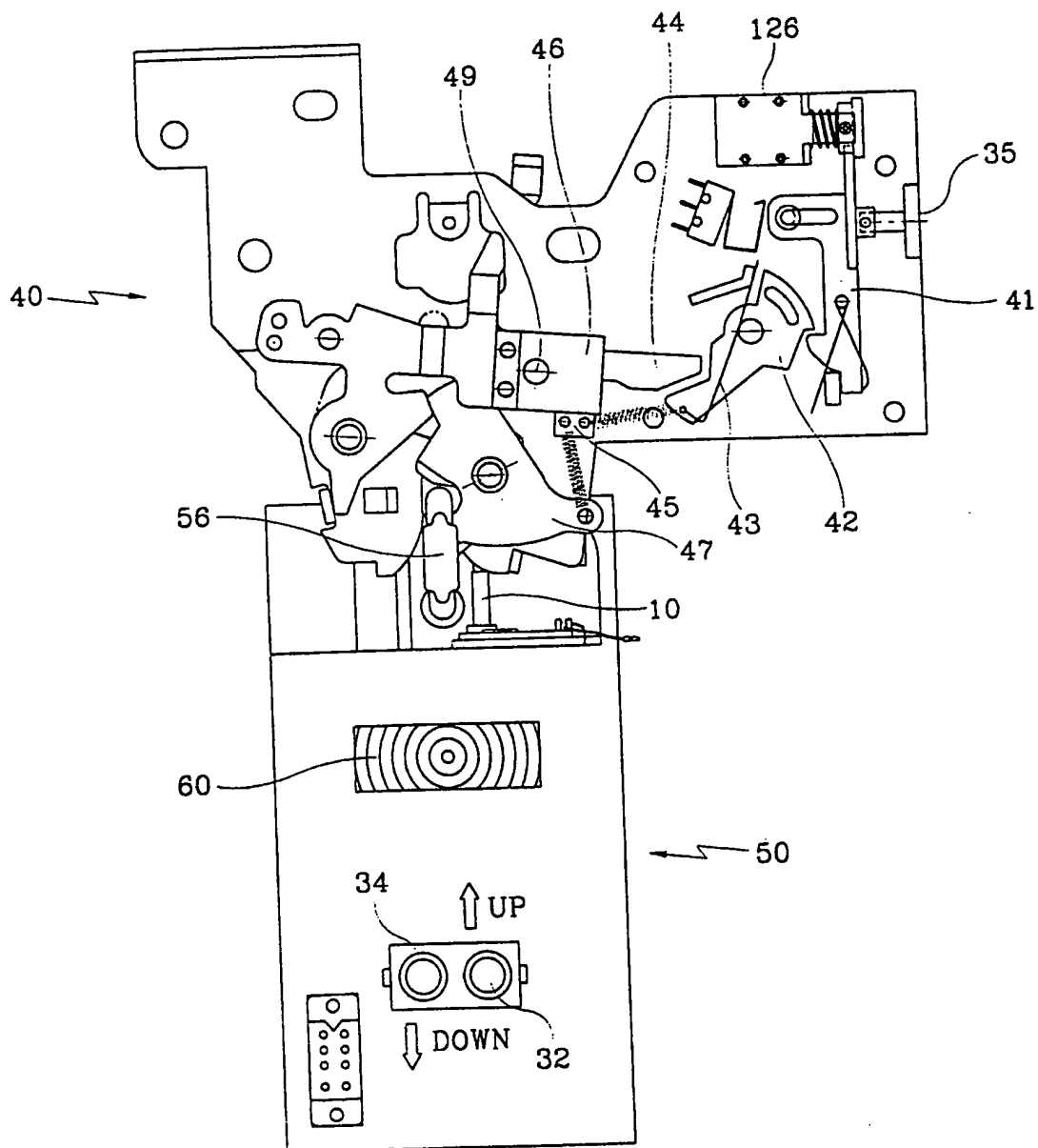
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FIG. 2



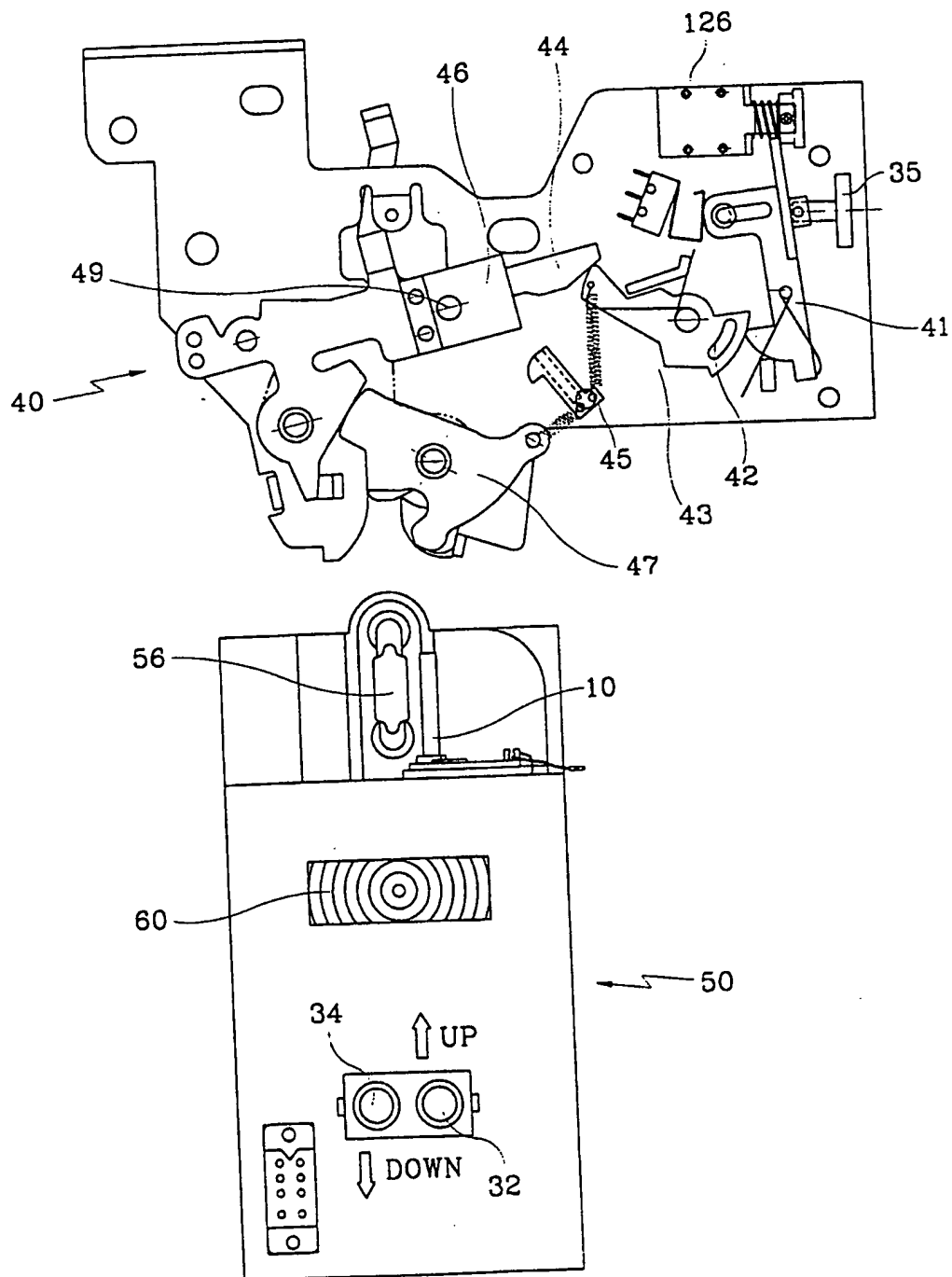
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FIG. 3



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FIG. 4



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FIG.5a

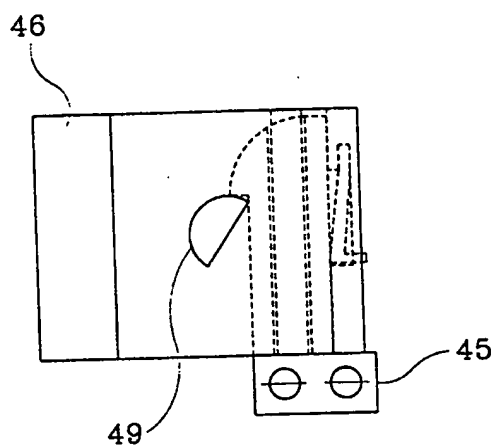
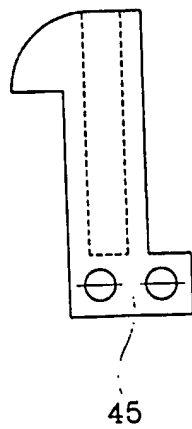


FIG.5b

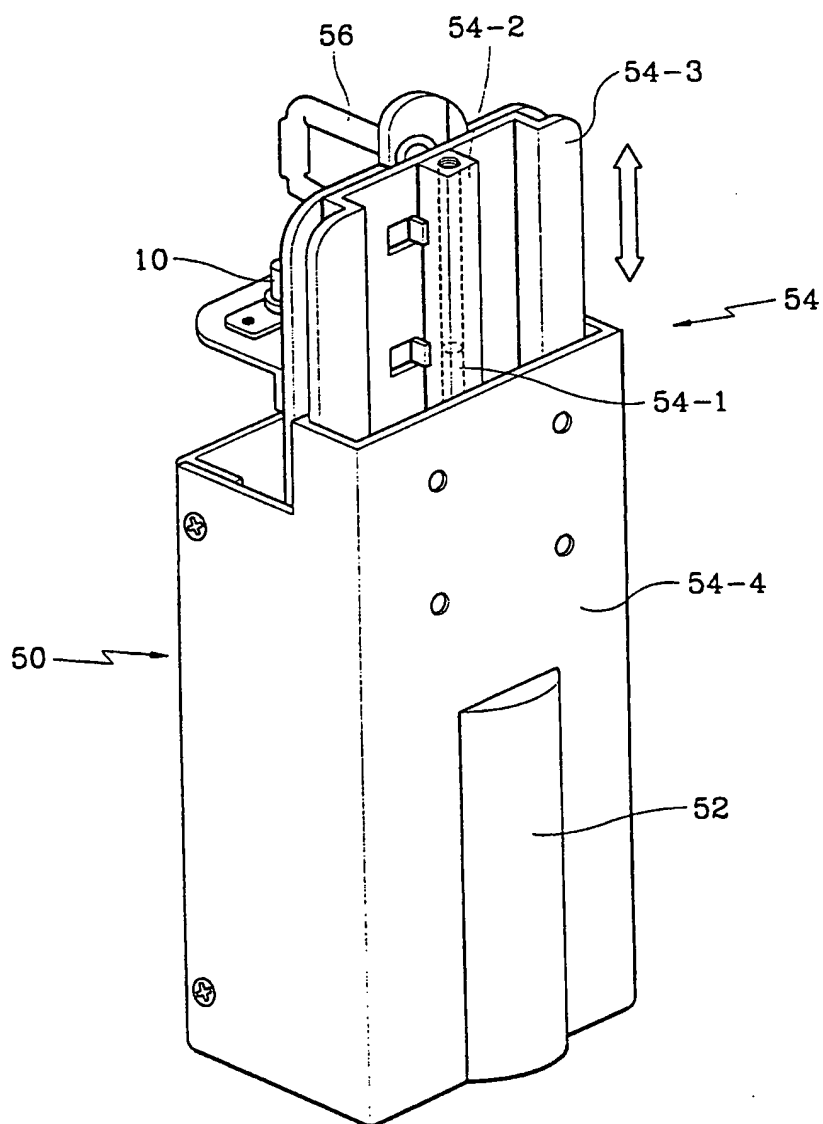


FIG.5c



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FIG. 6



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FIG. 7

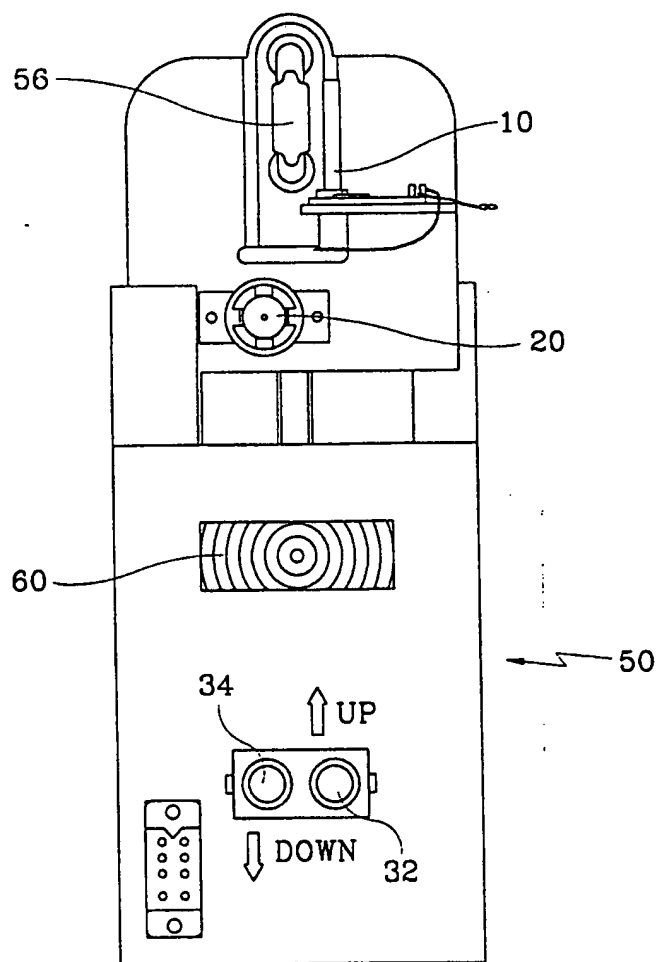


FIG. 8

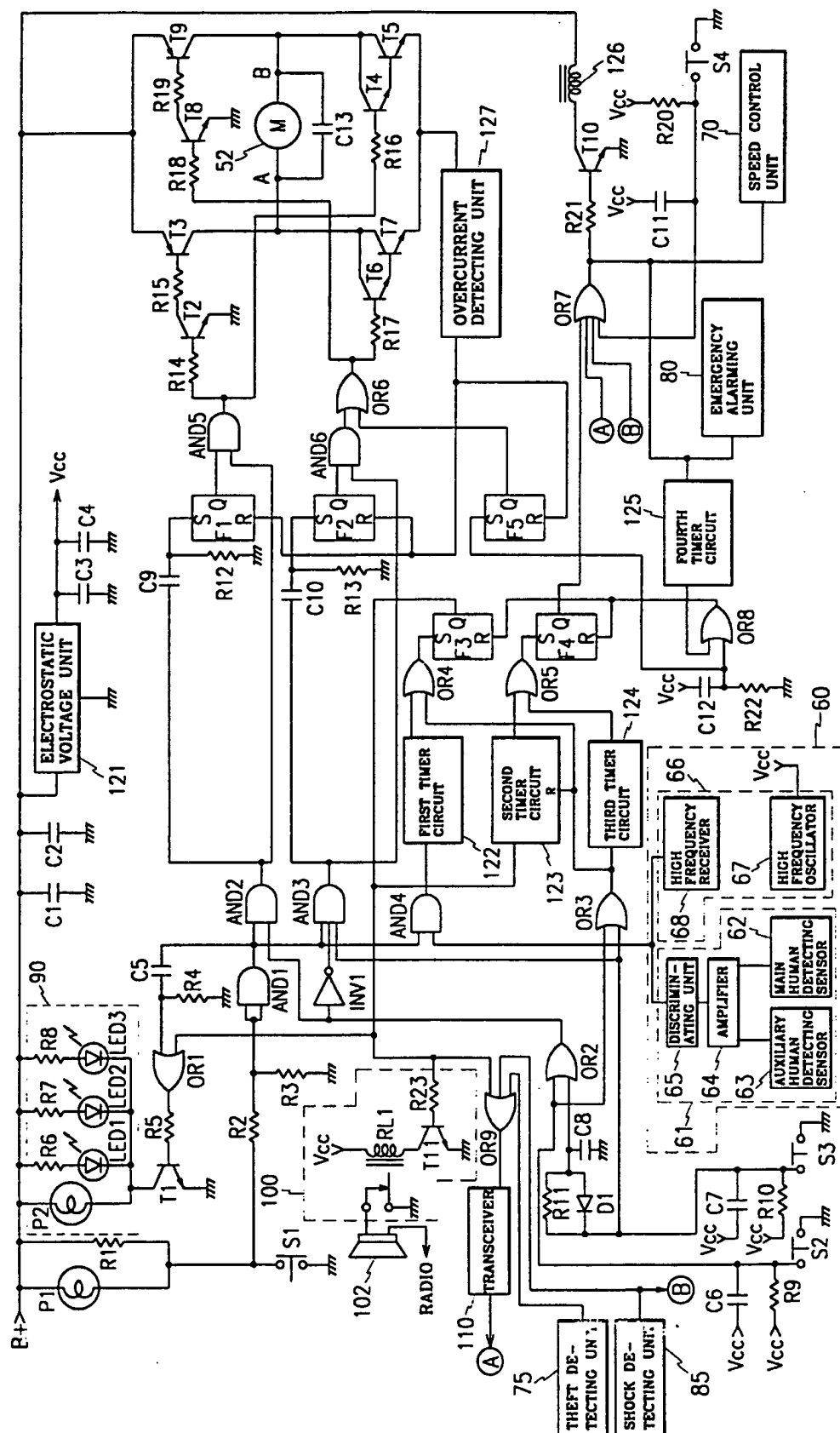
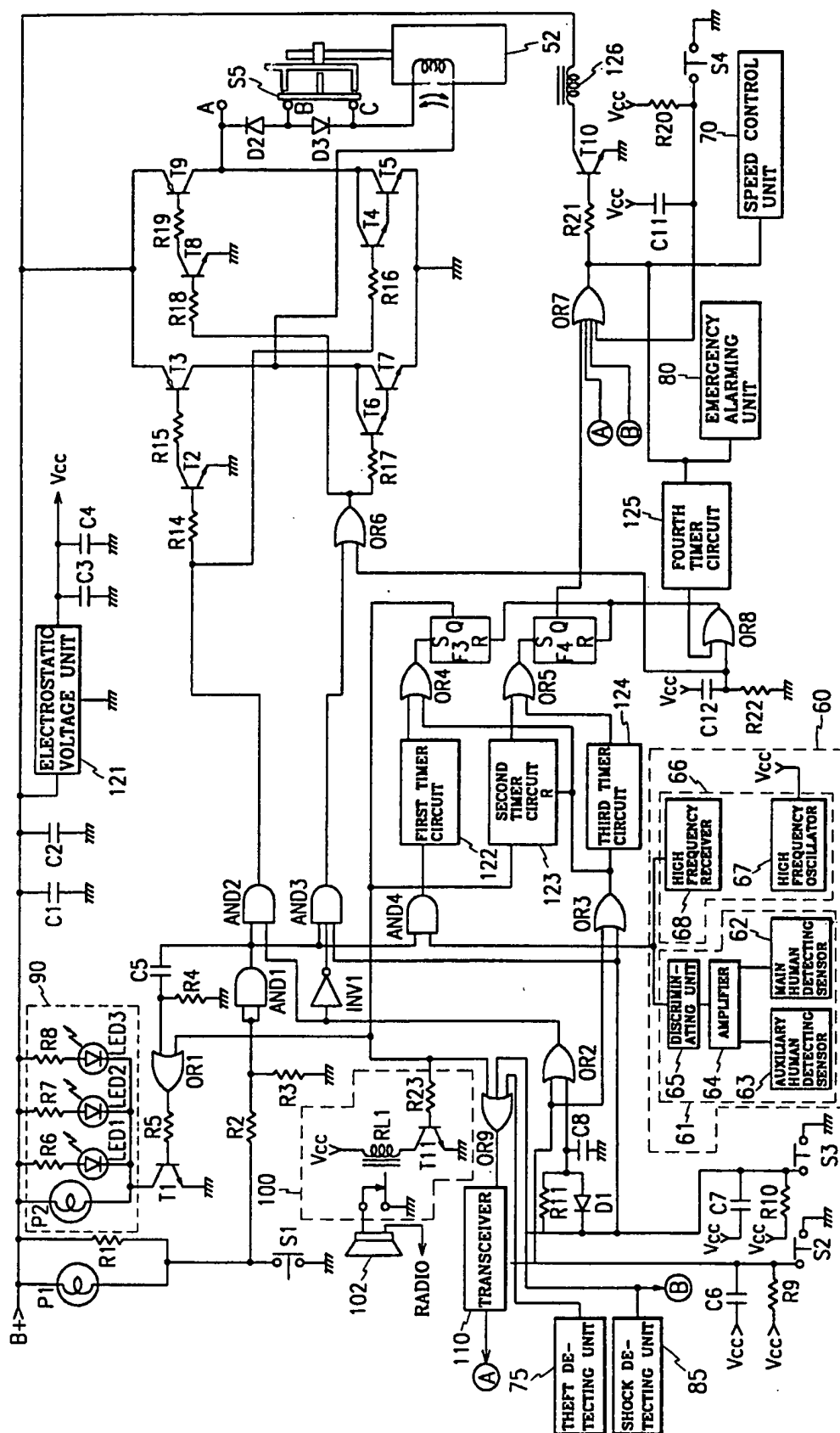


FIG. 9



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FIG.10

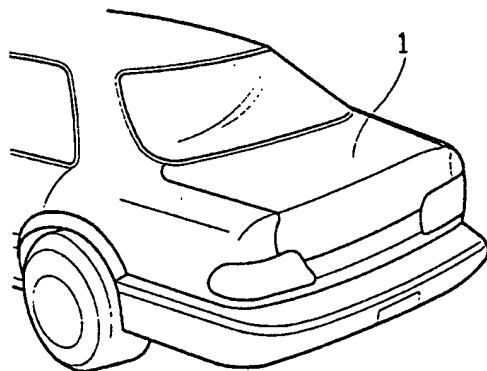
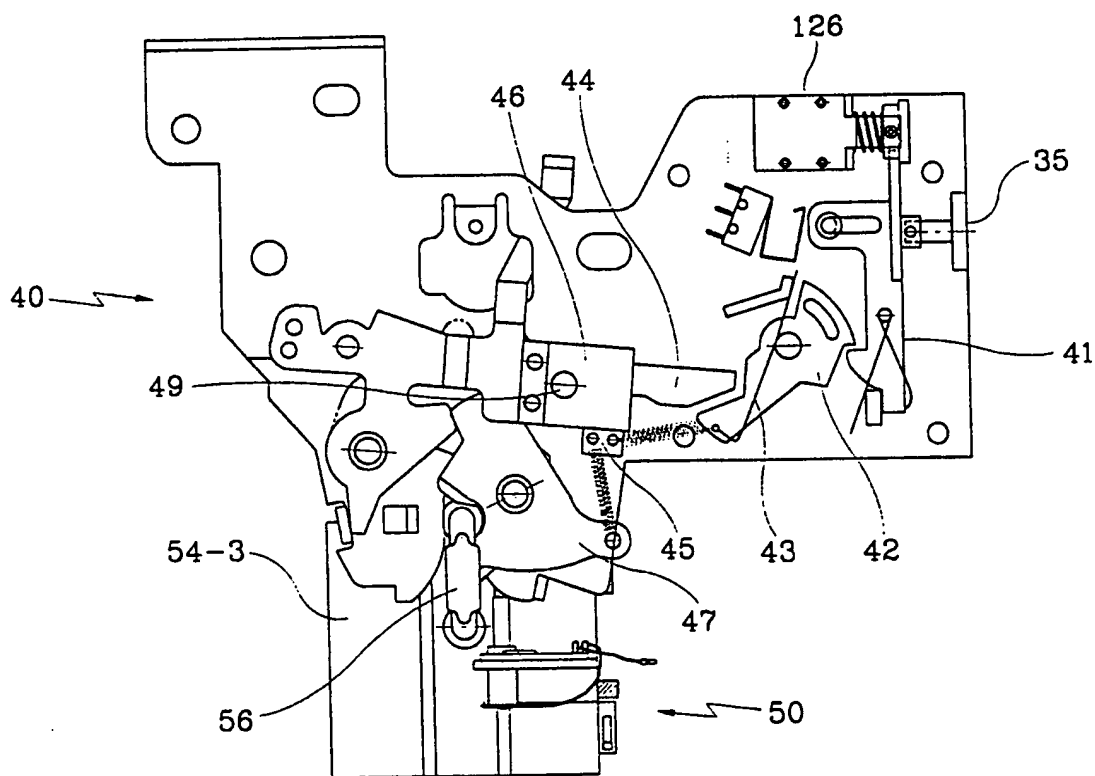


FIG.11



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FIG.12

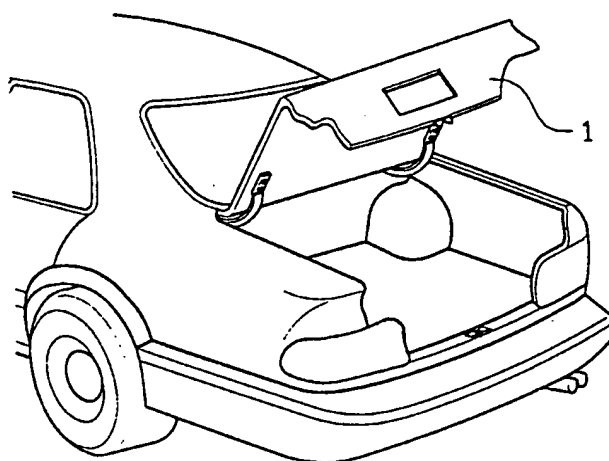
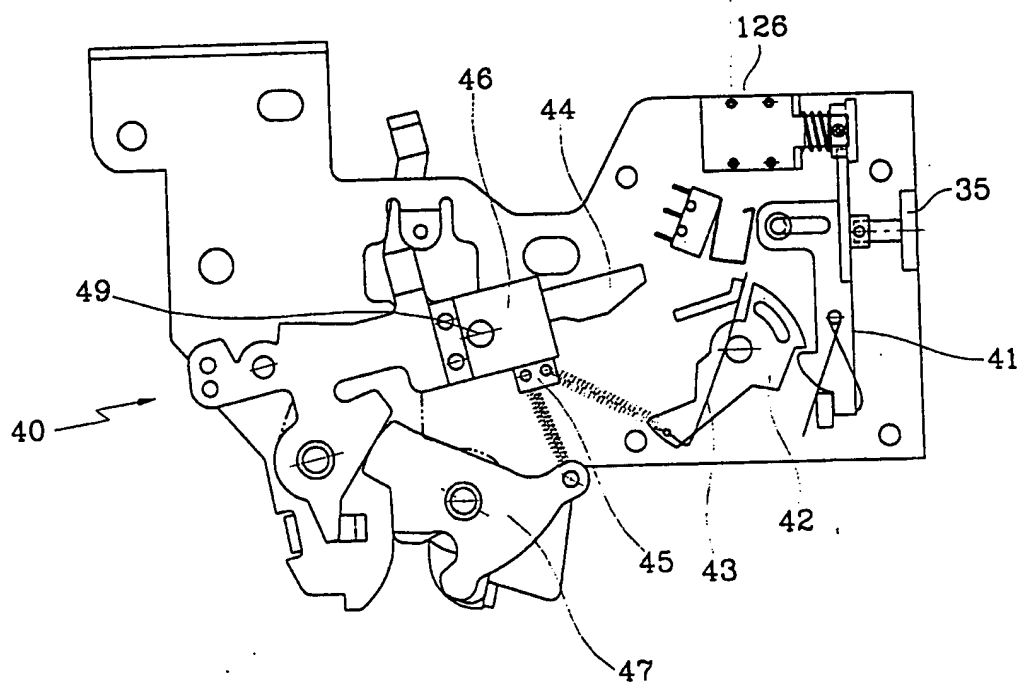
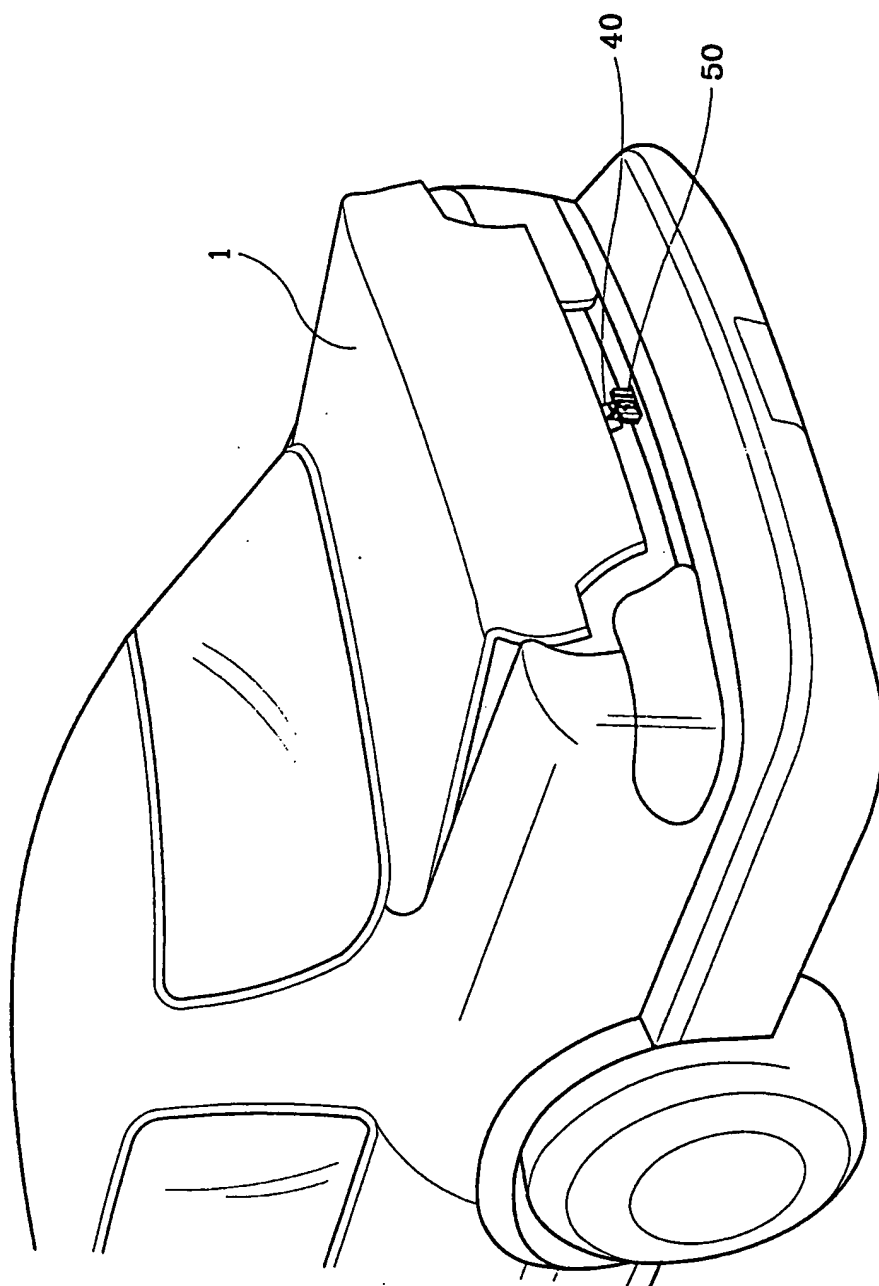


FIG.13



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FIG.14



INTERNATIONAL SEARCH REPORT

International application No.

PCT/KR 98/00207

A. CLASSIFICATION OF SUBJECT MATTER

IPC⁶: E 05 B 65/19

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC⁶: E 05 B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPODOC, WPI

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X A	US 5 445 326 A (FERRO et al.) 29 August 1995 (29.08.95) abstract; column 5, lines 29 - 42; fig. 3.	1 2
A	US 4 155 233 A (LIRA) 22 May 1979 (22.05.79), abstract; fig. 1-3.	1
A	US 4 080 812 A (KNOTT) 28 March 1978 (28.03.78), abstract; column 1, lines 8-20; fig. 1-4.	1
A	US 3 992 909 A (McGHEE) 23 November 1976 (23.11.76), abstract; fig. 2-4.	1

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

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Date of the actual completion of the international search

14 October 1998 (14.10.98)

Date of mailing of the international search report

28 October 1998 (28.10.98)

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/KR 98/00207

Im Recherchenbericht angeführtes Patentdokument Patent document cited in search report Document de brevet cité dans le rapport de recherche	Datum der Veröffentlichung Publication date Date de publication	Mitglied(er) der Patentfamilie Patent family member(s) Membre(s) de la famille de brevets	Datum der Veröffentlichung Publication date Date de publication
US A 5445326	29-08-95	keine - none - rien	
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US A 3992909	23-11-76	keine - none - rien	

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